GEOMORFOLÓGIA A ENVIRONMENTÁLNE VÝZVY

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Stages of evolution of the glacial landsystem in Central Poland after Warta Glaciation (Late Saalian)

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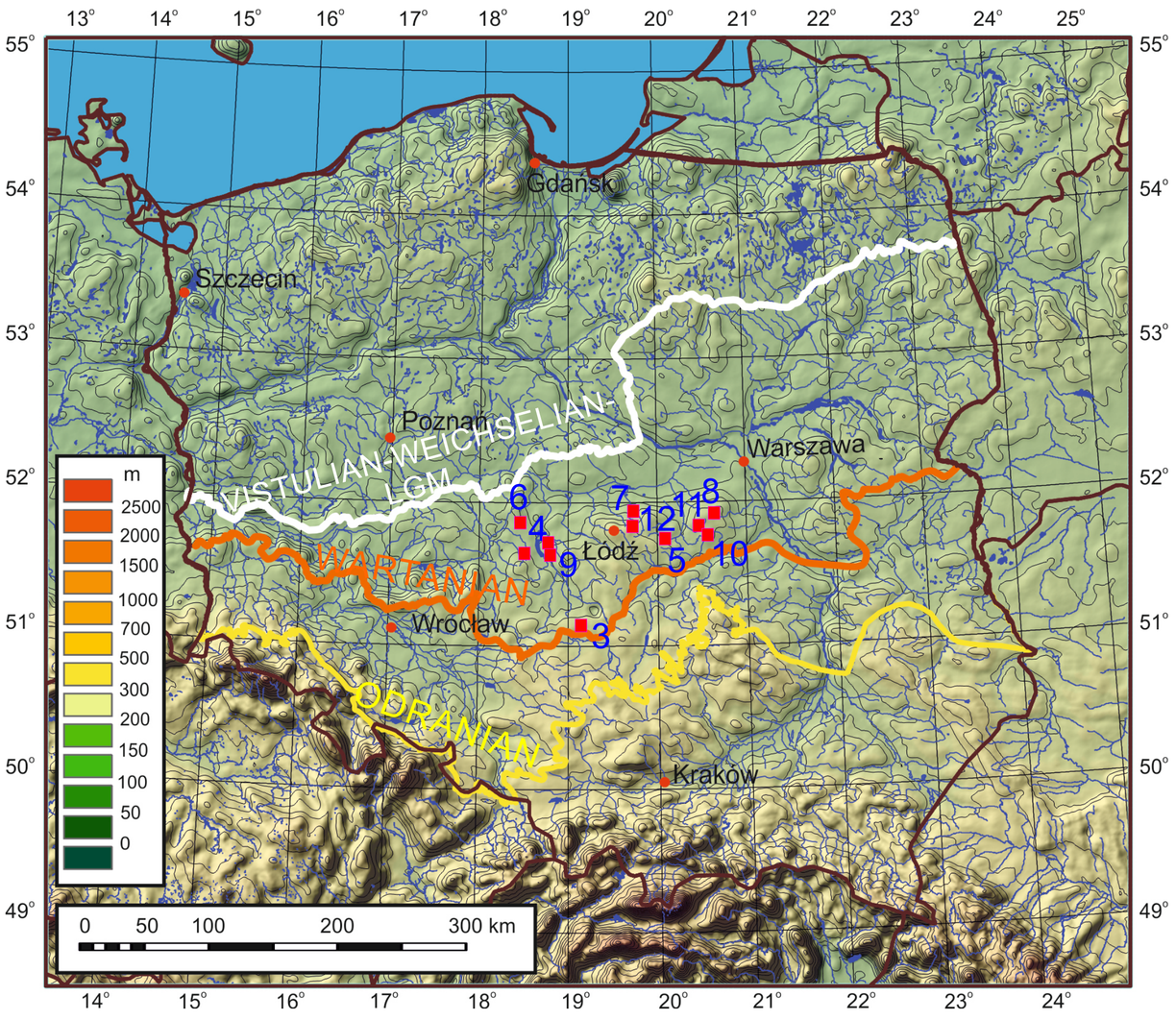

Fig. 1. Location of the sites (numbers of photos) on the background of the relief and the glacial limits in Poland

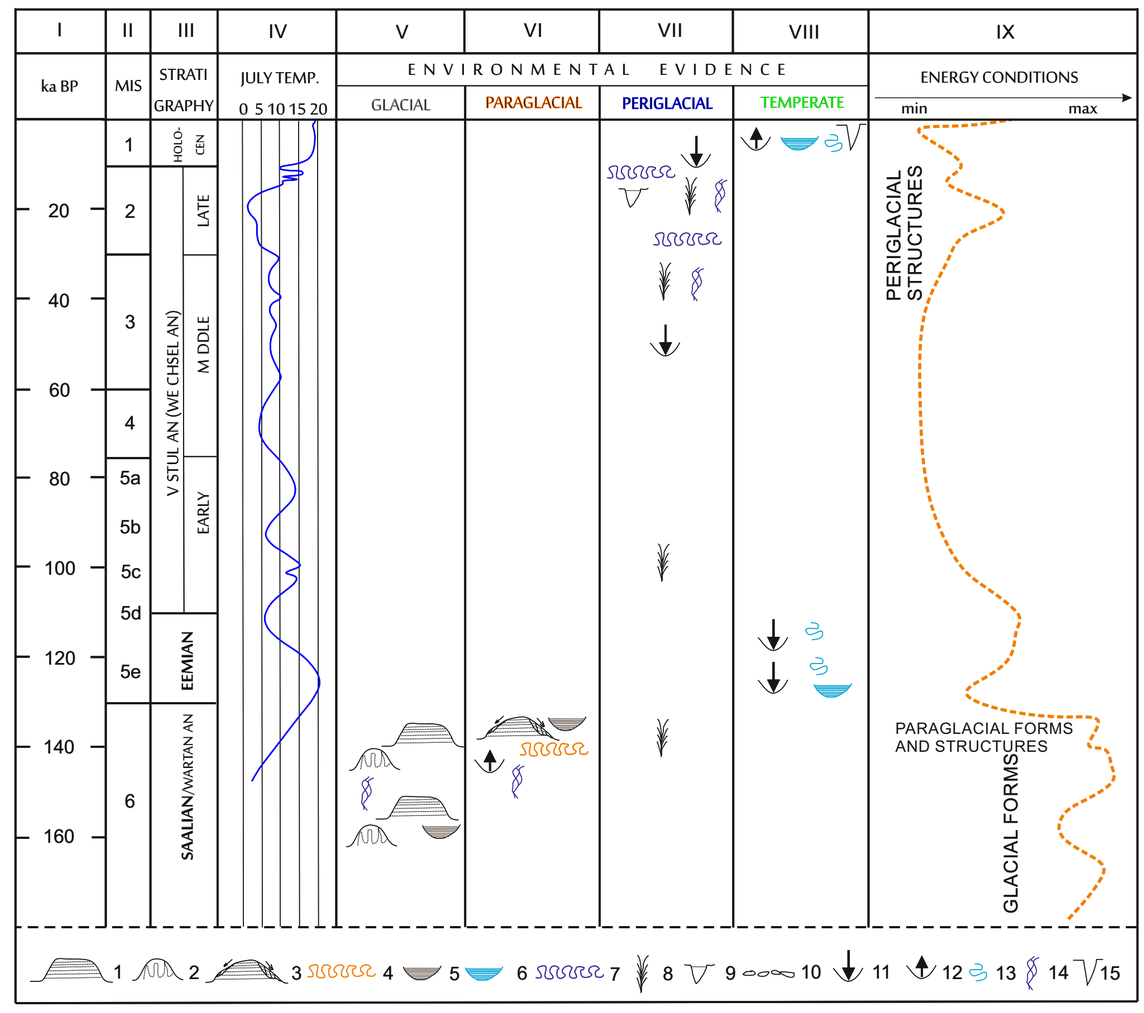

Fig. 2. Environmental evidence of evolution of the Warthanian landscape in Central Poland. Transition from glacial landscape to poligenetic landscape of Holocene

1 - kames, esker and other glacifluvial forms, 2 - marginal ridges and hills with glaciotectonic deformations, 3 - paraglacial slides, debris flow and other movemenst of sediments by gravity, 4 - deformations of inverse density gradient in paraglacial environment, 5 - glaciolimnic sediments, 6 - limnic sediments, 7 - deformations of inverse density gradient in periglacial environment (involutions), 8 - syngenetic ice-wedge pseudomorphs, 9 - sand wedges,10 - gravelly-stonny pavements, 11 - tendency to erosion in river valleys, 12 - tendency to aggradation in river valleys, 13 - gullies

GLACIAL FEATURES

Fig. 3. Borowa Góra. Kame hill and sandur plain

Fig. 4. Siedlątków, Łask Upland Plain. Glacitectonic deformations from the late phase of the Warta Glaciation

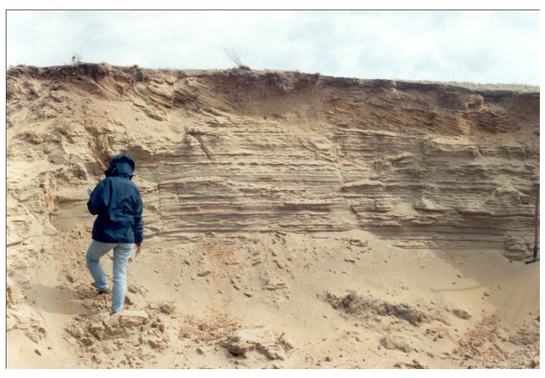

Fig. 5. Łochów. Glaciolacustrine sands in kame hillock hillock

Fig. 6. Rylsk, Turek Upland Plain. Gravels ans sands in esker

PERIGLACIAL FEATURES

Fig. 7. Tymianka, Łódź Heights. Syngenetic pseudomorphs (Late Warta)

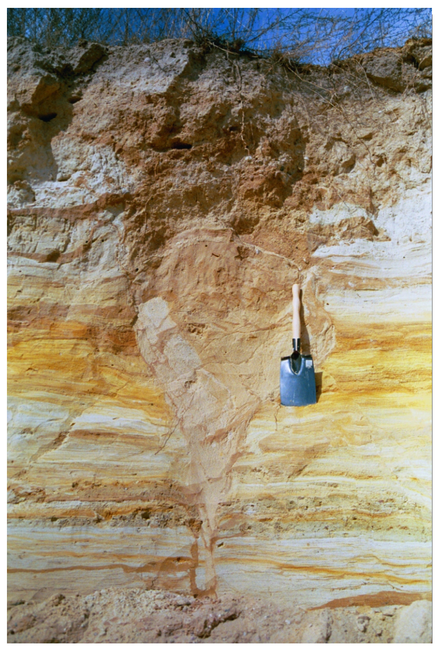

Fig. 8. Rzymsko, Rawa Upland Plain. Sand wedge (Late Vistulian)

The last glaciation of Central Poland took place in Late Saalian (Warta Stage, Illinoian Stage, MIS 6). The glacial relief which was shaped at that time, was reshaped in the next stages of Pleistocene (from MIS 5e to MIS 1) in changing climate conditions – from temperate to arctic.
The significance of individual factors and morphogenetic environments has been a subject of debate since the early 1950s, when the concept of periglacial morphogenesis, represented mainly by Jan Dylik, was formed. According to his views, the glacial relief of Central Poland was substantially transformed by periglacial processes in the last cold stage of Pleistocene (from MIS 4 to MIS 2) and in major part became denudational relief.
However, it has been found out that there are instances of glacial landsystems (spaces of areal deglaciation in particular) whose initial relief remained almost unchanged. Presently, researchers distinguish between several types of relief with different stages of morphogenetic transformation – from well-preserved glacial landscapes (particularly kame fields and areas of poorly diversified morainic plateau) to largely transformed, denudational-erosive areas (such as Łódź Heights). Despite the spatial diversification of morphogenetic environments in Central Poland, one may enumerate the following stages of relief transformation after Warta Glaciation (MIS 6):

- **Termination of Warta Glaciation/Start of Eemian** (MIS6/5e): local significance of paraglacial processes (slope and fluvial processes in extraglacial areas); minor local significance of periglacial processes (sporadic permafrost, few syngenetic wedges in outwash sediments)
- **Eemian**: fluvial erosion, organic accumulation in closed depressions
- **Vistulian** (Weichselian; MIS4-2): intensified aeolian processes in Late Plenivistulian and Late Vistulian; local significance of slope processes (slope wash, solifluction)
- **Holocene** (MIS 1): geomorphologic effects of anthropopression: slope wash (Fig. 3), locally reactivated aeolian processes, riverbed evolution

PARAGLACIAL FEATURES

Fig. 9. Siedlądków, Łask Upland Plain. Paraglacial slope and lacustrine sediments and structures

Fig.9a. Siedlądków, Łask Upland Plain. Debris flow sediment on the side part of the erosional channel

Fig. 10. Łaszczyn, Rawa Upland Plain. Kettle hole (closed depression) in paraglacial sediments near esker

Fig. 11. Łaszczyn, Rawa Upland Plain. Deformation in the structure of the esker

TEMPERATE FEATURES

Fig. 12. Parowy Janinowskie near Łódź as an example of Neoholocene form of gully erosion

References

Dylik J., 1952, The concept of the periglacial cycle in Middle Poland. Bull. Soc. Sci. Lettr. Łódź, 3, 5.

Klajnert Z., 1978. Zanik lodowca warciańskiego na Wysoczyźnie Skierniewickiej i jej północnym przedpolu (Disappearance of the Wartanian ice sheet from the Skierniewicki area and its northern foreland). Acta Geogr. Lodz., 38, p. 1-149.

Rdzany Z., 1997, Kształtowanie rzeźby terenu między górną Rawką a Pilicą w czasie zaniku lądolodu warciańskiego. Acta Geographica Lodziensia, 73, pp. 146.

Rdzany Z., 2009. Rekonstrukcja przebiegu zlodowacenia warty w regionie łódzkim [Reconstruction of the course of the Warta Glaciation in the Łódź Region]. Wydawnictwo Uniwersytetu Łódzkiego, Łódź, pp. 310.

Roman M., Dzieduszyńska D., Petera-Zganiacz J., 2014, Łódź region and its northern vicinity under Vistulian Glaciation conditions. Questiones Geographicae, 33 (3), pp. 155-163.

Turkowska K., 2006, Geomorfologia regionu łódzkiego. Wydawnictwo Uniwersytetu Łódzkiego, Łódź, pp. 238.